CMPG-767/CMPT-477 Image processing and Analysis

Project 5

Graduate Students:

1. (**50 points**) Using a function utilizing a spatial domain linear filter, which you designed in Project 2, design the following (do not forget to take care of boundary effects):

   a) a function utilizing Laplacian 2 edge detection (Lecture 8, slide 21, right column) for detection of downward intensity jumps and upward intensity jumps. This function should have a parameter determining which intensity jumps (upward or downward) should be detected.

   b) a function utilizing Laplacian detector of edges oriented in various directions (Lecture 8, slide 22). This function should have a parameter determining in which direction edges should be detected.

   c) a function utilizing a Sobel edge detector (slides 30-31) – take into consideration that Sobel detector is based on the summation of horizontal and vertical edges, which should be detected using separate kernels.

2. (**20 points**) Design a function utilizing unsharp masking with a 3x3 window (Lecture 7, slide 8). *k* should be a calling argument and specified by the user in each specific case. Do not forget to take care of boundary effects.

3. (**25 points**) Choose a test image and process it using functions 1 a)-c) and 2. Also find a linear combination of your test image with its edged images obtained by Laplacian 2 (both upward and downward) and Sobel edge detection: 0.85 * image + 0.15 * edged image.

4. **(5 points**) Write a brief technical report with your results.

   Turn in your source code, report, and resulting images.

Undergraduate Students

1. (**35 points**) Design a function utilizing a Sobel edge detector (slides 30-31) – take into consideration that Sobel detector is based on the summation of horizontal and vertical edges, which should be detected using separate masks. Do not forget to take care of boundary effects.

2. (**35 points**) Design a function utilizing unsharp masking with a 3x3 window (Lecture 7, slide 8). *k* should be a calling argument and specified by the user in each specific case. Do not forget to take care of boundary effects.

3. (**25 points**) Choose a test image and process it using functions 1 and 2. Also find a linear combination of your test image with its edged image obtained by Sobel edge detection: 0.85 * image + 0.15 * edged image.

3. **(5 points**) Prepare a report showing there your original images and processing results.
5. Turn in your source code, report, and resulting images.